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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/650,344

08/28/2003

Sung-Yung Lee

5649-1162

6659

7590

08/11/2005

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EXAMINER

QUINTO, KEVIN V

ART UNIT

PAPER NUMBER

2826

DATE MAILED: 08/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/650,344

Applicant(s)

LEE ET AL.

Examiner

Kevin Quinto

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 May 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-20,33-38,44 and 45 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-20,33-35,38,44 and 45 is/are allowed.
- 6) ☒ Claim(s) 1-3,5-9,36 and 37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>27 May 2005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-3, 5-9, 36, and 37 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3 and 5-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Okudaira et al. (USPN 5,459,345).
4. In reference to claim 1, Okudaira et al. (USPN 5,459,345, hereinafter referred to as the "Okudaira" reference) discloses a similar device. Figure 15 of Okudaira discloses an interlayer dielectric (101) formed on a semiconductor substrate (31). A buried contact plug (9a) extends a distance through the interlayer dielectric (101) to be in electrical communication with a predetermined region of the semiconductor substrate (31). An oxidation barrier pattern (11) made of titanium nitride is disposed on a top surface of the buried contact plug (9a). A lower electrode (13) is disposed on the oxidation barrier pattern (11). A top surface area of the oxidation barrier pattern (11) is substantially equal to a bottom surface area of the lower electrode (13). The lower

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electrode (13) includes an external sidewall and the oxidation barrier pattern (11) includes a sidewall such that the external sidewall of the lower electrode (13) and the sidewall of the oxidation barrier pattern (11) are aligned in a substantially straight line. A dielectric film (15) is disposed over the lower electrode sidewalls such that the dielectric film (15) conforms to the lower electrode sidewall and the oxidation barrier sidewall in a substantially straight line orientation.

5. With regard to claim 2, the oxidation barrier pattern (11) comprises a metal nitride (column 4, lines 24-26).

6. In reference to claim 3, the lower electrode (13) of Okudaira meets the claim (column 14, lines 22-23).

7. In reference to claim 5, an upper electrode (17) is disposed over the lower electrode (13). The dielectric film (15) is interposed between the lower electrode (13) and the upper electrode (17) thus forming a capacitor.

8. With regard to claim 6, Okudaira also discloses (claim 4, column 21, lines 11-14, and column 22, lines 1-4) that the dielectric film (15) may also be made of PLZT, PZT, STO, Ta₂O₅, or BTO. Huang (USPN 6,353,269 B1) discloses that ONO has a dielectric constant between 13 and 14 (column 6, lines 38-40). Krivokapic (USPN 6,452,229 B1) discloses that the dielectric constants of PZT, STO, Ta₂O₅, or BTO are greater than 14 (columns 8 and 9, Table I). Furthermore Yunogami et al. (United States Patent Application Publication No. US 2001/0006245 A1) discloses that PLZT has a dielectric constant greater than 100 (p.1, paragraph 6). Therefore Okudaira meets the claim.

9. In reference to claim 7, the dielectric film (15) is made of PZT, which the applicant has characterized as being a ferroelectric substance (p.8, lines 29-31 of applicant's current specification). Okudaira also discloses (claim 4, column 21, lines 11-14, and column 22, lines 1-4) that the dielectric film (15) may also be made of PLZT, STO, or BTO, which are all known ferroelectric substances (see Kubota et al., United States Patent Application No. US 2002/0008724 A1, p. 25, paragraph 325), thus meeting the claim. Okudaira also discloses (claim 4, column 21, lines 11-14, and column 22, lines 1-4) that the dielectric film (15) may also be made of BST, which is a known ferroelectric substance (see Leung et al., USPN 5,563,762, column 1, lines 46-50), thus meeting the claim.

10. In reference to claim 8, the upper electrode (17) of Okudaira meets the claim (column 14, lines 37-39).

11. With regard to claim 9, figure 15 of Okudaira shows a transistor which is connected to the oxidation barrier pattern (11) thus forming a memory cell.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okudaira et al. (USPN 5,459,345) in view of Iwasa (USPN 5,959,319) and further in view of Kimura (USPN 6,118,144).

14. With regard to claim 36, the lower electrode (13) of Okudaira in figure 15 has a closed surface bottom disposed on the oxidation barrier pattern (11). Okudaira teaches all of the claimed invention except for a lower electrode which is cylindrically-shaped. However the use of cylindrically shaped electrodes is well known in the art. Iwasa (USPN 5,959,319) discloses that a cylindrically shaped electrode increases the effective surface area of the electrode (column 5, lines 38-41). Kimura (USPN 6,118,144) discloses that increasing the surface area of the electrode is desirable since it increases the storage capacitance which is desirable in the art (column 1, lines 18-26). In view of Iwasa and Kimura, it would therefore be obvious to use a cylindrically shaped capacitor electrode in the device of Okudaira.

15. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okudaira et al. (USPN 5,459,345) in view of Iwasa (USPN 5,959,319) and further in view of Kimura (USPN 6,118,144).

16. With regard to claim 37, the lower electrode (13) of Okudaira in figure 15 has a closed surface bottom disposed on the oxidation barrier pattern (11). Okudaira teaches all of the claimed invention except for a lower electrode which has two substantially spaced apart extending sidewalls with an open upper portion or is cylindrically-shaped. However the use of cylindrically shaped electrodes is well known in the art. Iwasa (USPN 5,959,319) discloses that a cylindrically shaped electrode increases the effective

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surface area of the electrode (column 5, lines 38-41). Kimura (USPN 6,118,144) discloses that increasing the surface area of the electrode is desirable since it increases the storage capacitance which is desirable in the art (column 1, lines 18-26). In view of Iwasa and Kimura, it would therefore be obvious to use a cylindrically shaped capacitor electrode which has two substantially spaced apart extending sidewalls with an open upper portion in the device of Okudaira.

Allowable Subject Matter

17. Claims 10-20, 33, 34, 35, 38, 44, and 45 were allowed in a previous Office action.

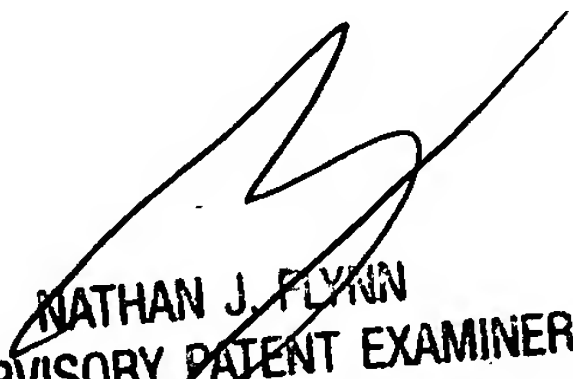
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quinto whose telephone number is (571) 272-1920. The examiner can normally be reached on M-F 8AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306 but starting on July 15, 2005, the new fax phone number will be (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KVQ



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